DESIGN AND DEVELOPMENT OF WEB PLATFORM FOR STUDENT TEACHERS WITH DIVERSIFIED NEEDS BASED ON UNIVERSAL DESIGN FOR LEARNING

A
Revised Synopsis
Submitted to
Dayalbagh Educational Institute,
(Deemed University)
For the Partial Fulfillment
of the Requirements for the Degree of
DOCTOR OF PHILOSOPHY
[2019]

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INTRODUCTION

Education and learning are the most important of all human activities and always have been the principal means of creating productive and sustainable societies. Education is mainly concerned with the ways and means of teaching and learning. Even of these two, the latter appears to be more vital as it is not only concerned with what the teachers do but also with what knowledge they transmit to their students and what the students do to assimilate the knowledge. At the beginning of the last century, it was understood that more information transfer was teaching. Students were taught in a rigidly formal and fixed way. The teacher had very less teaching aids to supplement or substitute oral teaching. Differences in individual knowledge, learning abilities, and styles are not usually accommodated. As a result, students often demonstrate lower retention rates, poor performance, dependence on rote learning, and lack of enthusiasm (Rusten, 1999).

This is the time of the revolution. Many educational institutions are changing their teaching and learning process by modifying their teaching goals, curriculum, methods, assessments etc. They are considering students as active learners and emphasis on the subject of instruction is shifted to the nature of the learners. Teachers are using different innovative methods of teaching and trying to engage the whole classroom by presenting content in novel and interesting ways. Still, many students struggle to succeed in a one size fits all regular education curriculum. However, recent brain research and theories of learning clearly indicate that each learner is special (i.e., unique), with varied abilities and qualities, and that the typical classroom represents a vast range of learner differences (Meyer & Rose, 2000; Rose & Meyer, 2002). In fact, categorizing students into two groups regular and special oversimplifies learner differences and fails to accurately represent the diversity of today's student population.

The problem to cater the needs of diverse students in an inclusive classroom is still present. There are various good approaches and methods of teaching which can be used according to the needs of different students separately, but still there is a need of an approach of teaching, by which the needs of all students are being fulfilled at starting point and without any kind of retrofitting teacher can easily teach in an inclusive classroom. One framework for addressing the diversity of all

students and creating a flexible curriculum that supports access, participation, and progress for all learners is universal design for learning (UDL; Meyer & Rose, 2000; Rose & Meyer, 2002).

1.1 UNIVERSAL DESIGN FOR LEARNING (UDL)

Accessibility or, in general, access, is a complex problem, that can present itself in many domains and can be considered from many angles. In the 1970s architect Ronald Mace, as an example, conceptualized the problem of the accessibility of buildings. He proposed a paradigm to be followed by those who want to design spaces and objects that do not present any barriers to their users, following an approach based on intervention on the environment, rather than on people with special needs. This is now commonly referred to as Universal Design (Mace, 1985; Story, Mace, & Mueller, 1998) and is mainly based on the idea that it is more convenient to design buildings and objects that are already accessible, as in respectful of the users' diversity, rather than to adapt inaccessible spaces retrofitting them to fill their gaps. Its main focus is on designing products and services that can be of use to anybody.

Universal Design, when applied in the educational technology field, considers technology as an effective means to remove barriers to information and, ultimately, to learning. Its main objective is to support people with disabilities, but its "Universal" nature extends its reach and effectiveness beyond such groups.

IDEA 2004 defines universal design using the same definition as the AT Act of 1998, as amended, 29 U.S.C. 3002. (34CFR§ 300.44): "The term 'universal design' means a concept or philosophy for designing and delivering products and services that are usable by people with the widest possible range of functional capabilities, which include products and services that are directly accessible (without requiring assistive technologies) and products and services that are interoperable with assistive technologies" (Section 3[19] of Assistive Technology Act as amended in 2004).

Since the end of the 1980s, the field of instructional content design saw an increase in interest towards the novel approaches brought forward by Universal Design. This created the conditions for the development of new instructional design frameworks, with many names such as Universal Instructional Design (Higbee, 2001), Universal Design for Learning (Rose & Meyer, 2002) and

Universal Design for Instruction (S. S. Scott, Mcguire, & Shaw, 2003). They all proposed sets of guidelines to design inclusive learning content and evaluate its accessibility and, ultimately, its inclusiveness. If the goal of UD is the removal of barriers from the physical environment, the goal of UDL is the elimination barriers from the learning environment. As David Rose (2005), one of UDL's founders has stated, "UDL puts the tag 'disabled' where it belongs on the curriculum, not the learner. The curriculum is disabled when it does not meet the needs of diverse learners" (Council for Exceptional Children, 2011). Although it has been available in this fashion for some decades now, Universal Design seems still far from becoming a standard in instructional design practices.

The origin of the term Universal Design for Learning (UDL) is generally attributed to David Rose, Anne Meyer, and colleagues at the Center for Applied Special Technology (CAST). The principles of UDL were developed following the 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA) (Rose D., 2005). According to Rose and Meyer (2002), UDL is built on the premise that "barriers to learning occur in the interaction with the curriculum—they are not inherent solely in the capacity of the learner. Thus, when education fails, the curriculum, not the learner should take responsibility for adaptation" (Rose and Meyer, 2002).

The Council for Exceptional Children (CEC) has offered a definition of universal design in education: In terms of learning, universal design means the design of instructional materials and activities that make the learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember. Universal design for learning is achieved by means of flexible curricular materials and activities that provide alternatives for students with differing abilities. These alternatives are built into the instructional design and operating systems of educational materials-they are not added on after-the-fact. (Research Connections, Number 5, Fall 1999, p.2)

UDL provides a vision for breaking the "one-size-fits-all" mold and therefore expands the opportunities for learning for all students with learning differences (Rose D., 2005). UDL provides a blueprint for creating flexible goals, methods, materials, and assessments that meet the needs of diverse learners (Rose, Meyer, & Hitchcock, 2005). In UDL designing is done from the

beginning, not added on later. It Increases access opportunities. UDL is not dependent on technology, it is also being applied to the development and delivery of learning opportunities, separate from technology applications.

UDL defines goals that provide appropriate challenges for all students, ensuring that the means is not a part of the goal. It uses methods that are flexible and diverse enough to support and challenge all learners. It uses materials that are flexible and varied and take advantage of digital media, such as digitized text, multimedia software, video recorders, tape recorders, and the Internet. In UDL multiple means of representation of content are used like —Text to speech, Images with Text, closed caption with videos and images, modifiable formatting, hyperlinks for meanings, choices for content and topic selection, and multiple ways of assessment and engagement are used. Which are beneficial to many people, not just those with disabilities or struggle in learning. In UDL assessment techniques are used that are sufficiently flexible to provide ongoing, accurate information to inform instruction and determine student understanding and knowledge (Rose & Meyer, 2002).

Bringing UDL into classrooms and educational practice may sound like a difficult task, and it is, if a classroom is guided by vaguely defined goals and equipped with only conventional instructional methods, traditional materials (e.g., textbooks and pencils), and inflexible options for demonstrating knowledge and understanding (e.g., written responses, either essay or multiple choice). For that reason, the UDL framework addresses the whole curriculum— goals, materials, methods, and assessments—to make it more accessible not only physically but also intellectually and emotionally (Hitchcock, Meyer, Rose, & Jackson, 2002; Jackson & Harper, 2005).UDL implementation provides the opportunity for all students to access, participate in, and progress in the education curriculum by reducing barriers to instruction.

CAST (2011) has given three principles, nine guidelines and thirty-one checkpoints of UDL, these are discussed in the following pages:

1.2 PRINCIPLES OF UNIVERSAL DESIGN FOR LEARNING

According to research conducted by CAST, learning occurs as a result of the workings of three brain networks: recognition networks, strategic networks, and effective networks. In order to

activate and address these three brain networks in the process of learning and knowing that these systems don't work alike in any two people, we must provide for multiple means of representation, expression, and engagement. According to CAST (2011) UDL's three principles are: 1) Provide multiple means of representation; 2) Provide multiple means of action and expression, and 3) Provide multiple means of engagement (CAST, 2011).

1.2.1 Provide multiple means of representation, to give learners various ways of acquiring information and building knowledge. Learners differ in the ways that they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or cultural differences, and so forth may all require different ways of approaching content. Others may simply grasp information quicker or more efficiently through visual or auditory means rather than printed text. Also learning, and transfer of learning occurs when multiple representations are used because it allows students to make connections within, as well as between, concepts. In short, there is not one means of representation that will be optimal for all learners; providing options for representation is essential.

1.2.2. Provide multiple means of action & expression, to provide learners alternatives for demonstrating what they know and what they have learned. Learners differ in the ways that they can navigate a learning environment and express what they know. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with strategic and organizational abilities (executive function disorders), those who have language barriers, and so forth approach learning tasks very differently. Some may be able to express themselves well in written text but not speech, and vice versa. It should also be recognized that action and expression require a great deal of strategy, practice, and organization, and this is another area in which learners can differ. In reality, there is not one means of action and expression that will be optimal for all learners; providing options for action and expression is also essential.

1.2.3. Provide multiple means of engagement, to tap into learners' interests, over appropriate challenges, and increase motivation. Affect represents a crucial element to learning, and learners differ markedly in the ways in which they can be engaged or motivated to learn. There are a

variety of sources that can influence individual variation in effect including neurology, culture, personal relevance, subjectivity, and background knowledge, along with a variety of other factors presented in these guidelines. Some learners are highly engaged by spontaneity and novelty while others are disengaged, even frightened, by those aspects, preferring strict routine. Some learners might like to work alone, while others prefer to work with their peers. In reality, there is not one means of engagement that will be optimal for all learners in all contexts; providing multiple options for engagement is also essential.

Sheryl Burgstahler & Rebecca Cory (2009), also give seven principles of UDL. The main concept of the principle of UDL given by CAST (2011) and Sheryl Burgstahler & Rebecca Cory (2009) is the same, but their way of presentation is different. According to Sheryl Burgstahler and Rebecca Cory (2009), principles of Universal Design for Learning include:

1. Equitable use: Design is appealing and usable for all.
2. Flexibility in use: Choice in methods of use and consideration of preferences is part of the design.
3. Simple and intuitive use: Consistency and ease of use are considered in the design.
4. Perceptible information: Information is presented in several ways to accommodate various learner needs. Information is clear and well organized.
5. Tolerance for error: Guidelines and instructions help to steer the learner away from errors or hazards.
6. Low physical effort: Navigation is clear and requires no unnecessary redundancies.
7. Size and space approach and use: Appropriate space to accommodate various learner needs is made available.

1.3 GUIDELINES FOR UNIVERSAL DESIGN FOR LEARNING

The UDL Guidelines were developed in response to the call from stakeholders in the education field to make the application of UDL principles and practices more concrete. The Guidelines are organized according to the three main principles of UDL that address representation, expression, and engagement. For each of these principles, specific “checkpoints” for options are highlighted, followed by examples of practical suggestions. The UDL Guidelines are not meant to be a

"prescription" but a set of strategies that can be employed to overcome the barriers inherent in most existing curricula. They may serve as the basis for building in the options and the flexibility that is necessary to maximize learning opportunities for all students. CAST first published version 1.0 of the UDL Guidelines in April of 2008 and in February 2011 version 2.0 of the UDL Guidelines were published. Table 1 exhibits the UDL guidelines.

Table 1: Principles Guidelines and Checkpoints of UDL

Principle I. Provide Multiple Means of Representation	**Principle II. Provide Multiple Means of Action and Expression**	**Principle III. Provide Multiple Means of Engagement**
Guideline 1: Provide options for perception	**Guideline 4: Provide options for physical action**	**Guideline 7: Provide options for recruiting interest**
1.1: Offer ways of customizing the display of information 1.2: Offer alternatives for auditory information 1.3: Offer alternatives for visual information	4.1: Vary the methods for response and navigation 4.2: Optimize access to tools and assistive technologies	7.1: Optimize individual choice and autonomy 7.2: Optimize relevance, value, and authenticity 7.3: Minimize threats and distractions
Guideline 2: Provide options for language, mathematical expressions, and symbols	**Guideline 5: Provide options for expression and communication**	**Guideline 8: Provide options for sustaining effort and persistence**
2.1: Clarify vocabulary and symbols 2.2: Clarify syntax and structure 2.3: Support decoding of text, mathematical notation, and symbols 2.4: Promote understanding across languages 2.5: Illustrate through multiple media	5.1: Use multiple media for communication 5.2: Use multiple tools for construction and composition 5.3: Build fluencies with graduated levels of support for practice and performance	8.1: Heighten salience of goals and objectives 8.2: Vary demands and resources to optimize challenge 8.3: Foster collaboration and community 8.4: Increase mastery-oriented feedback
Guideline 3: Provide options for comprehension	**Guideline 6: Provide options for executive functions**	**Guideline 9: Provide options for self-regulation**
3.1: Activate or supply background knowledge 3.2: Highlight patterns, critical features, big ideas, and relationships 3.3: Guide information processing, visualization, and manipulation 3.4: Maximize transfer and generalization	6.1: Guide appropriate goal-setting 6.2: Support planning and strategy development 6.3: Facilitate managing information and resources 6.4: Enhance capacity for monitoring progress	9.1: Promote expectations and beliefs that optimize motivation 9.2: Facilitate personal coping skills and strategies 9.3: Develop self-assessment and reflection
Resourceful, knowledgeable learners	**Strategic, goal-directed learners**	**Purposeful, motivated learners**

The UDL Guidelines have been developed to support educators, administrators, curriculum developers, policymakers, and publishers. The Guidelines were developed with support from the US Department of Education, Office of Special Education Programs through the National Center on Accessing the General Curriculum (NCAC) (1999-2004), a collaborative project led by CAST.

1.4 ONLINE LEARNING AND UNIVERSAL DESIGN FOR LEARNING

The development of information technology has transformed the teaching and learning process for everyone, and it has changed most people's lives as well (Coombs, 2010). The explosion of online learning is one of the results of recent advancements in information technology. With the advent of technology and the easy access to the internet, online mode seems the natural way to ensure access to education to students all over the world. However, a Center on Online Learning and Students with Disabilities at the University of Kansas study has found the majority of online educational products are not designed to meet the needs of students with disabilities and struggling learners. With the access provided by assistive applications, people with disabilities now have an exciting world of previously unavailable information at their fingertips (Coombs, 2010). Furthermore, many instructors have students in their online classes who have disabilities but they don't realize it.

Online content, as it is very poorly aligned with the principles of UDL, for an individual with reading, processing, comprehension or other challenges, or individuals with disabilities, with auditory, processing or a number of other issues, they are going to have challenges with the online content (Smith, 2016). Each online learning product developed has specific features, advantages, and disadvantages that influence personalized learning experiences. The structure of the lessons is critical to meet user expectations and fulfill their individual needs within the learning experience (Smith, 2016). Universal Design involves the usability of that technology and extends to how the technology is integrated into the learning plan, along with the other elements of the course.

Currently, many learners with or without disabilities utilize technology such as screen readers, close-captioned videos, seating arrangements and a test environment that minimizes distractions that contribute to their success in higher education (Higbee, Katz & Schultz, 2010). Additionally,

Totty and Kalivoda, (2008) recognize additional ways the Web, computer hardware and software and other technologies can help learners and promote equal access. However, Coombs (2010) notes that for online courses there should also be accessibility to the learning infrastructure, and accessibility to the actual course content and the learners needs to be well-versed in the assistive technology that is provided by the educational organization.

UDL is not limited to assistive technology; it also enhances pedagogy and instructional practices used for learners with and without disabilities (King-Sears, 2009). Instructors using UDL principles plan course instruction, materials, and content to benefit people of all learning modalities without adaptation or retrofitting, including students with disabilities and non-traditional groups such as international students who may speak English as a second language. It focuses on equal access to information, as well as learning. "Simply stated, Universal Design is just good teaching" (The Ohio State University Partnership Grant, 2013). With this as a main focus, courses using UDL should ensure that the learning goals of the course provide an appropriate academic challenge for the college student and that the assessment is flexible enough to provide accurate, continuous information that helps instructors revise instruction to maximize learning for diverse learners (Fox, Hatfield, & Collins. 2003). In addition, Hodge and Preston-Sabin (1997) conclude that accommodations for students with disabilities may simply result from good instruction. Additionally, UDL mirrors best practices for pedagogy that follow many of Chickering and Gamson's (1987) principles such as multiple teaching methods that allow for student's preferred learning styles (Higbee, Katz & Schultz, 2010; Rao & Tanners, 2011). In other words, the course learning goals should be challenging to the students while the instructor incorporates ways to limit or remove barriers to access and participation (Hitchcock, et al. 2002). At their best, UDL practices include continuous evaluation of student learning through assessing specific outcomes set forth in rubrics that include study guides (Bernacchio & Mullen, 2007; He, 2014).

The University of Arkansas at Little Rock (n.d.) provides a comprehensive guide to implementing UDL in online classes. Their Ten Simple Steps toward Universal Design of Online Classes include a guide for the creation and design of an online course using UDL These include:

(1) create content first-then design; (2) provide simple and consistent navigation; (3) include an accommodation statement; (4) choose content management system (CMS) tools carefully; (5) model and teach good discussion board etiquette; (6) use colour with care; (7) provide accessible document formats; 8) choose fonts carefully; (9) convert PowerPoint to HTML; and (10) if the content is auditory make it visual, and if it is visual make it auditory.

These 10 steps are consistent with the three basic principles of UDL, presentation, which include providing the students with multiple opportunities to learn with various ways for them to acquire knowledge (presentation), demonstrating what they know (action and expression) and encouraging students' interest while challenging them (engagement and interaction), as well as increasing motivation and self-regulation (ACCESS Project, 2010; CAST, 2008; Rose & Mayer, 2008). The three principles, nine guidelines, thirty-one checkpoints, and ten steps should be considered when developing an online course and formulate a syllabus for the course.

1.0 EMERGENCE OF THE PROBLEM

The evolution of the Internet and other technologies have led to tremendous growth in opportunities to teach and learn outside the environment of the traditional classroom. Over the past decade, the Internet has brought learning "online" and offers many advantages: it is convenient, available at any time, and can be accessed nearly anywhere in the world.

Each year witnesses an increased number of students with disabilities participating in online schools (Coy, 2013). There is new evidence that traditionally marginalized populations, such as students with disabilities, increasingly choose to participate in online courses at higher rates than other student populations (Thompson, Ferdig, & Black, 2012) (Coy & Marino, 2014). In India, the enrolment in higher education has grown considerably during the last 5 years, which has increased from 3,23,36,234 in 2013-14 to 3,66,42,378 in 2017-18 (All India Survey on Higher Education 2017-18, 2018). The overall growth of enrolment in higher education is 13.3%. Despite attending higher education in increasing numbers, many students with disabilities are mainstreamed without being fully assimilated into college life and are also not visible in the classroom (Higbee, Katz, & Schultz, 2010). The persons with disability (PWD) student growth rate is 8.3% from 2013 to 2018. At present out of 3,66,42,378 there are only 74,317 PWD students

enrolled in higher education (All India Survey on Higher Education 2017-18, 2018), which is the only 0.20% of total enrolment in higher education.

As we know distance education and online learning modes are increasing day by day. In 2018, UGC also lifted a previous ban on online degree programs – a move it deems crucial for increasing the tertiary net enrolment ratio (NER) to 30 percent by 2020. Online courses also play a crucial role in teacher education programs nowadays. These online courses serve a diverse population of pupil teachers from different geographical areas, different age groups, and learners having different interest, attitude, aptitude, and different backgrounds. Distance teacher education programs attract many "non-traditional students", learners who do not fit the profile of a typical college-age young adult. "Non-traditional students" include students who live in rural and remote communities, students with disabilities, and adult learners who are returning to school to earn degrees. These non-traditional students have a range of characteristics and needs, based on their backgrounds, experiences, and life situations. Our non-traditional learners are often: rural and remote students, some from traditional and indigenous cultures, students with disabilities, adult learners, students for whom the language of instruction is not a first language and learner who are not much familiar with the technology and don't know how to use content available online efficiently. These different learners have different needs and they face different barriers while accessing online content.

The content provided by the educators is only in written text format or in the form of video lectures. Mostly content is provided in English language only and learners who are from different language backgrounds and do not have fluency in the English language are not able to understand the content properly. No other kinds of presentation method like captioned videos, images, mind-maps are provided to the learners. In online courses, learners don't have any community to discuss their problems and clear their doubts. The assessment method is again limited to written assignments and subjective examinations. These all (i.e. text-based content, lecture method of teaching, no community to discuss with, the medium of content is only English and the same method of assessment) become problematic for learners having different learning needs.

These all reason and problems gave an insight to the researcher to work in a field by which barriers faced by learners having different need be overcome specifically in a teacher education online course. After reviewing literature related to these problems the researcher found a more related approach that is Universal Design for learning (UDL).

2.0 JUSTIFICATION OF THE PROBLEM

The vision of the Department of Higher Education, MHRD is to realize India's human resource potential to its fullest in the higher education sector, with equity and inclusion. Its mission is to provide greater opportunities of access to higher education with equity to all the eligible persons and in particular to the vulnerable sections. Enhancement of Gross Enrolment Ratio will be done by expanding access through all modes (About Department of Higher Education, 2016). Vice President of India Mr. M. Venkaiah Naidu said while addressing the Special Convocation 2017 of SRM University, in Chennai, Tamil Nadu, that "the higher education in the country is passing through a phase of unprecedented expansion, he further added that the challenge of providing equal opportunities for quality higher education is also a historic opportunity for correcting sectoral and social imbalances" (Nayak, 2017).

Unfortunately, most online courses fail to provide adequate learning outcomes for students with special needs. As Rao, k. (2013) mention in her paper some challenges that non-traditional students may experience in an online environment, are ambiguity/ uncertainty about expectations, excessive dependence on text-based learning, isolation/lack of learning community, technology challenges (Ho & Burniske, 2005; McLoughlin & Oliver, 2000; Rao, Eady, Edelen-Smith, 2011, Zepke & Leach, 2002). The obstacles faced by students with disabilities (i.e. study materials that are not in electronic formats, uncaptioned video, PDF files that do not contain any real text and therefore cannot be searched or read aloud by text-to-speech software) are often the same obstacles encountered by students who possess different learning styles, use the latest computer technologies, or whose native language is not English.

When a student struggles in the classroom or in an online course, questions usually focus on the student: Does he/she have a learning disability? Is this student's reading, writing and listening skills are not equal to the other children in the class? Does he/she not pay enough attention during

learning? Until recently, there has been comparatively little focus on the role of the curriculum in these struggles. Center for Applied Special Technology (CAST) researchers gradually realized that the core issue was frequently not students' learning problems; instead, the problem lay with the curriculum. Instead of fixing the students, time would be better spent fixing the curriculum. This insight sparked a new goal: eliminating barriers in the design of the learning environment.

To ensure that all students have genuine opportunities to get a quality education, educators need to develop a new understanding of learner differences. In looking for ways to include all learners in high-quality, standards-based educational settings, educators and researchers should examine ways in which the curriculum presents barriers and supports to academic achievement by diverse learners and how the curriculum can be developed to include all learners from the outset. (Meo, 2008)

Research has shown that only a small number of university web sites meet even the minimum standards for accessibility (Ahmad, 2016). As the higher education institutes become more digitized nowadays, the accessibility of online learning sites should be given preference to help individuals with print and vision impairment to improve accessibility. Though the Government of India has implemented a scheme of Higher Education for Persons with Special Needs (HEPSN) through the University Grants Commission (UGC), a remarkable gap is perceived between policy and practice. Analysis of various literature reviews and case studies of persons with disabilities show that significant barriers remain in the participation of disabled students in higher education. Institutions could explore new models of imparting education which is proving successful in other parts of the world. Existing sources of information and knowledge, such as information in the public domain and knowledge imparted through distance education should be made accessible to a wider audience. Areas needing particular attention were teaching and learning, monitoring and evaluation as well as support services like assistive technology to promote disability inclusion through accommodating and including students with disabilities (Ahmad, 2016).

To fix the problem, an approach Universal Design for Learning (UDL) can be used which promotes supporting every learner in their learning process. UDL is a framework that aligns well with current research in best practices for online instruction.

"When it comes to determining how appropriate online learning is for our audience, we needed to investigate if it is accessible," Smith (2016) said. "We found the majority of accessibility is focused only on physical and sensory disabilities. Those are important areas to address, but the majority of individuals with disabilities have learning, attention and behavioral needs that accessibility measures often ignore." "Invited In" sampled more than 1,000 online lessons from six major online learning vendors that cover more than 50 percent of the nation's K-12 online market. The lessons, which spanned multiple subject matters and grade levels, scored low in meeting the principles and guidelines of UDL. For example, when determining alignment to the first three UDL principles, the highest possible score was 36, yet only one of the six vendors scored a 7 or better (Smith, 2016).

As a relatively new framework, the literature on UDL is still evolving. Studies that have explicitly addressed the impact of the UDL framework on student learning are still limited in number. These include: individualized shared-stories for students with disabilities (Browder et al., 2008); a reading-literacy program that used UDL- scaffolded ebooks and software program (Coyne, Pisha, Dalton, Zeph, & Smith, 2012); a universally designed web-based text-environment for reading (Dalton, Proctor, Uccelli, Mo, & Snow, 2011); computer-based and online supports for vocabulary acquisition and comprehension (Hall, Cohen, Vue, & Ganley (2015); classroom-based UDL interventions for a science course (Dymond et al., 2006); and, a UDL designed module on the ‘mole’ for a chemistry curriculum (King-Sears et al., 2015); UDL with Online Credit Recovery (Squires, 2018); Online instruction with UDL (Coy, 2013); Synchronous Online Instruction (Coy & Marino, 2014); Al-Azawei, Serenelli and Lundqvist (2016) concentrated on Universal Design for Learning and its implementations; improvements in test results was found mainly in STEM and in contexts where tests were also built with accessibility in mind (King-Sears et al., 2015; Rappolt-Schlichtmann et al., 2013); perception of control and awareness of one’s learning path (Kumar & Wideman, 2014) and increased engagement of the students (Marino et al., 2014); Applying UDL in online corse (Dell, Dell & Blackwell, 2015); Students perception about UDL (Schelly, Davies, & Spooner; 2011).

Currently, there is a deficit in the literature relating to efficacious practices for higher education students with reference to inclusive online learning environments. These studies have done outside of India, no national study has been found. Hence it is the needed to do work in the field of online learning which is accessible to all learners. Ultimately, it is legal to ask questions about the sustainability of such an approach, and those questions need to become the basis for research hypotheses that can eventually be confirmed or disconfirmed. After undergoing the process of reviewing the researches, the following are the questions that arise in the mind of the researcher in the context of an online course for student teachers:

1. What type of student teachers may be enrolled in the teachers' training courses?
2. What are the barriers and problems they are facing in the context of an online course?
3. How can these barriers be reduced by incorporating UDL in the existing online course?
4. To what extent the developed UDL based content and web platform will fulfill the UDL guidelines?
5. Do participants in the study find the developed UDL based content and web platform worthwhile & what will be their perception towards it?
6. What will be the effect of developed UDL based content and web platform on the achievement of student teachers?
7. Will the developed UDL based content and web platform help in minimizing the barriers of learning caused by demographic variables of student teachers?

3.0 STATEMENT OF THE PROBLEM

Viewing the facts available in explored researches the researcher has identified the problem stated as "Design and Development of Web Platform for Student Teachers with Diversified Needs Based on Universal Design for Learning".

4.0 OPERATIONAL DEFINITION OF THE TERMS TO BE USED IN THE STUDY

5.1. UNIVERSAL DESIGN FOR LEARNING

Ron Mace (1997) defines Universal Design as **"**The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Center for Universal Design, 2008).

Universal Design for Learning (UDL) is a set of principles for curriculum development that gives all individuals equal opportunities to learn. UDL provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone not a single. It is not a one size fits all solution but rather flexible approaches that can be customized and adjusted for individual needs." (CAST, 2012)

Operational Definition

In this study, Universal Design for Learning (UDL) refers to an approach of curriculum design that can help to customize instructional goals, methods, materials, assessment, and tools of learning to serve all learners, regardless of their diverse needs, ability, disability, gender, cultural and linguistic background.

5.2. WEB PLATFORM

A web platform is a collection of code written in some programming language that is used to generate the dynamic web pages that make up a website (www.quora.om, 2019).

Operational Definition

In this study, Web Platform refers to a dynamic website where the content is available and accessible to the end users.

5.3. STUDENT TEACHERS

A student who is studying to become a teacher and who, as part of the training, observes classroom instruction or does closely supervised teaching in an elementary or secondary school (www.dictionary.com, 2012).

Operational Definition

In the present study student teachers refers to students studying in B.Ed. (Bachelor of Education) course recognized by NCTE.

5.4. STUDENT TEACHERS WITH DIVERSIFIED NEEDS

Diverse learner are learners with disabilities, different languages and cultures, different homes and family lives, different interests and ways of learning (J.D. Singh, 2016).

Operational Definition

In the present study student teachers with diversified needs refers to student teachers having different learning needs due to their diversity caused by habitation (urban, rural), Gender (male, female), Learning styles (auditory learner, kinesthetic learner, visual learner and reading writing learners), Language (English, Hindi) and differently able like (physical, visual, hearing impaired, etc.).

5.0 OBJECTIVES OF THE STUDY

The objectives of the present study are:

1. To analyze the needs and learning barriers faced by diversified student teachers with reference to the content and accessibility of online course.
2. To develop the UDL based Content and Web Platform for an online course for student teachers.
3. To assess the developed UDL based Content and Web Platform with reference to its Guidelines.
4. To study the effect of developed UDL based content and web platform on the achievement of student teachers.
5. To study the effectiveness of developed UDL based content and web platform on the perception (with reference to self-perceived; fatigue, creativity, level of concentration and understanding) of student teachers.
6. To compare the perception (with reference to self-perceived; fatigue, creativity, level of concentration and understanding) of student teachers with diversified needs, in the context of developed UDL based content & web platform.
7. To compare the effect of developed UDL based content & web platform on the achievement of student teachers with diversified needs.
8. To qualitatively analyze the effectiveness of developed UDL based content and web platform with reference to diversified needs and learning barriers faced by student teachers in the context of online course.

6.0 HYPOTHESES OF THE STUDY

$H_{\alpha 1}$: There will be a significant difference between the pre and post-test achievement scores of student teachers.

$H_{\alpha 2}$: There will be a significant difference between the pre and post-test perception scores of student teachers.

$H_{0\ 1}$: There will be no significant difference among the mean gain perception scores (with reference to self-perceived; fatigue, creativity, level of concentration and understanding) of student teachers with diversified needs.

$H_{0\ 2}$: There will be no significant difference among the mean gain achievement scores of student teachers with diversified needs.

7.0 DELIMITATIONS OF THE STUDY

The study will be limited to the following points:

1. Only one course which is offered to B.Ed. student teachers will be selected for content development.
2. Content for only one unit will be developed on the basis of UDL Guidelines.
3. Content will be developed only in two languages Hindi and English.
4. A Cohort group containing approximately 150 B.Ed. student teachers will be selected from a Teacher Training Institute.

8.0 VARIABLES IN THE STUDY

The variables related to the present study have been classified as:

Independent variable: Universal Design for Learning (UDL)

Dependent variables: 1. Achievement

2. Users' Perception towards learning web platform (With reference to self-perceived; fatigue, creativity, level of concentration and understanding)

Moderator variables: 1. Gender (male, female)

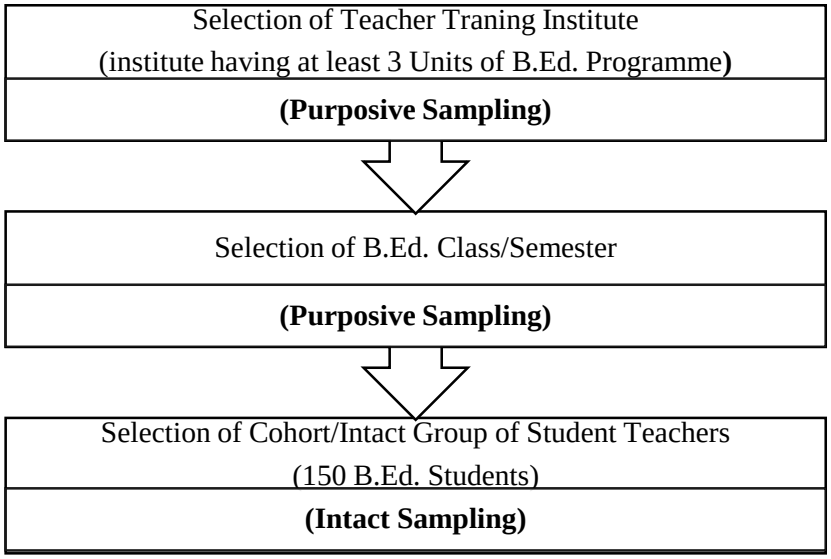
2. Habitation (urban, rural)

3. Learning styles (Auditory learner, Kinesthetic learner, visual learner, reading writing learners)
4. Language proficiency (English proficient, Non-English proficient)
5. Differently able / Non differently able

Controlled variables: 1. The teaching of one course of B.Ed.

2. B.Ed. student teachers

9.0 SAMPLE SAMPLING TECHNIQUE


Selection of Teacher Traning Institute
(institute having at least 3 Units of B.Ed. Programme)
(Purposive Sampling)
Selection of B.Ed. Class/Semester
(Purposive Sampling)
Selection of Cohort/Intact Group of Student Teachers
(150 B.Ed. Students)
(Intact Sampling)

10.0 METHOD OF THE STUDY

Mixed method research will be used in the present study. The developmental method will be used to develop the UDL based Content, Web platform, Users' Perception towards learning web platform Tool & Achievement Test. The experimental method will be used to test the effect of UDL based Content and Web platform on the Users' Perception (with reference to self-perceived; fatigue, creativity, level of concentration and understanding) & Achievement of student teachers. Data will be collected in both ways qualitatively and quantitatively.

11.0 DESIGN OF THE EXPERIMENT

The design of the experiment will be a Single Group Pre-Test Post-Test design.

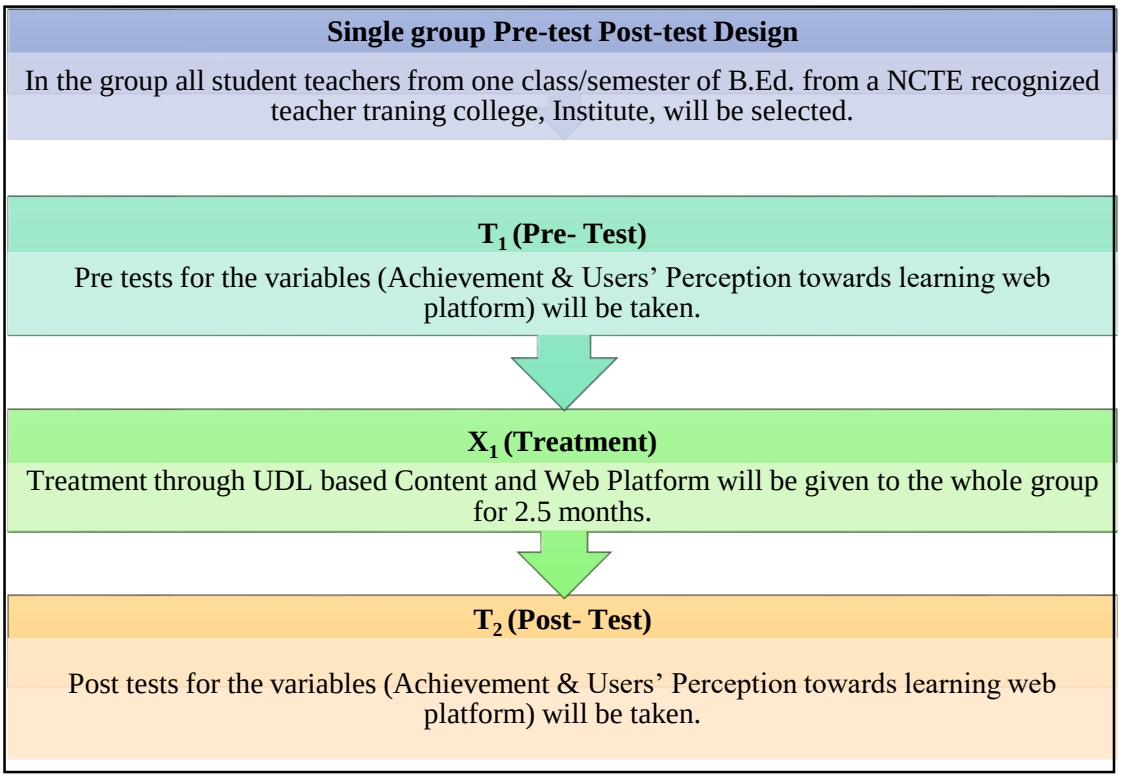

Single group Pre-test Post-test Design
In the group all student teachers from one class/semester of B.Ed. from a NCTE recognized teacher traning college, Institute, will be selected.
T1 (Pre- Test)
Pre tests for the variables (Achievement & Users' Perception towards learning web platform) will be taken.
X1 (Treatment)
Treatment through UDL based Content and Web Platform will be given to the whole group for 2.5 months.
T2 (Post- Test)
Post tests for the variables (Achievement & Users' Perception towards learning web platform) will be taken.

Figure 1: Design of the Experiment

12.0 PROCEDURE OF THE STUDY

The whole study can be divided into four distinct phases, which are as follows:

PHASE 1: Planning Phase

The first phase of the study is to select the sample and the course on which the whole study will be done. This phase will consist of the following stages:

Stage 1: Selection of sample.

Stage 2:Selection of one course offered to selected sample.

PHASE 2: Developmental Phase

The predominant phase of the present study will be the developmental phase, which involves the development of UDL based Content, Web Platform and other tools involved in the present study. It will be carried out in the subsequent stages, which are as follows:

Stage 1: Need Analysis: Identifying different kinds of student teachers and their problems related to online content & courses.

Stage 2:Development of Web Platform on the basis of UDL Guidelines.

This stage consist of the following sub-stages:

i. **Planning**: Planning related to the purpose of development of web platform and who will use this web platform, will be done.

ii. **Analysis**: Analysis will be done with reference to problems of student teachers regarding online course and how these problems will be reduced by incorporating UDL.

iii. **Design & development**: Layout of the web platform will be prepared. To make content accessible to all users, different forms of multimedia programs will be created on which content can be presented in different forms.

iv. **Testing**: Web platform will be analyzed and validated by the experts on the basis of UDL guidelines. Then testing related to the functioning of the web platform will be done. It will be also tested that users are able to find the information they need or they face difficulty to find it.

v. **Implementation and maintenance**: Web platform will be published on the server for the users. Time to time it will be updated and regularly monitored.

Stage 3: Development of online course content on the basis of UDL Guidelines

i. Content analysis of the course will be done with reference to UDL.

ii. Preparation of the first draft of content.

iii. Validation by experts.

iv. Preparation of final draft of content.

v. Upload on the web platform.

Stage 4: Construction of Achievement Test of the selected Unit.

i. Preparation of the first draft of Achievement Test.

ii. Validation by experts.

iii. Preparation of final draft of Achievement Test.

Stage 5: Construction of Users' Perception towards learning web platform Tool.

i. Preparation of the first draft of Users' Perception towards learning web platform Tool.

ii. Validation by experts.

iii. Preparation of final draft of Users' Perception towards learning web platform Tool.

PHASE 3: Experimental / Implementation Phase

The implementation of the UDL based content will be done in this phase. The accessibility of the UDL based Web platform to all the student teachers opting the selected course will be provided. The intervention period will be of 2.5 months. This phase will consist of the following stages:

Stage 1: Uploading the developed UDL based Content on Web Platform.

Stage 2: Provide accessibility of UDL Based Web Platform to the student teachers.

Stage 3:Administration of Pre-tests for the variables Achievement & Users' Perception towards learning web platform.

Stage 4:Provide accessibility of UDL Based content by the help of Web Platform to the student teachers.

Stage 5:Motivating student teachers to access the web platform and study the content.

PHASE 4: Collection of Data and Testing of Hypotheses

This will be the final Phase of the study. This phase will deal with the study to determine the effect of UDL based Content and Web Platform on Users' Perception and Achievement. In this phase firstly the data will be collected and then hypothesis will be tested. This phase will consist of three stages:

Stage 1: Administration of Users' Perception towards learning web platform Tool.

Stage 2: Administration of Achievement Test.

Stage 3: Qualitative and Quantitative Analysis of data.

13.0 TOOLS TO BE USED

Following self-constructed tools will be used in the present study:

1. Need analysis tool
2. UDL based Web Platform
3. UDL based Content
4. UDL Scan Tool
5. Achievement Test
6. Users' Perception towards learning web platform Tool

14.0 STATISTICAL TECHNIQUES TO BE EMPLOYED

Descriptive Statistics: Mean, Standard deviation, skewness and kurtosis will be used to know the nature of data. Inferential Statistics: t-test, ANOVA & ANCOVA will be used. χ^2 (Chi-Square) test will be used to compare scores of Users' Perception towards learning web platform on the basis of diversified needs. Graphical representation will be used for presenting data and results in visual form.

15.0 SIGNIFICANCE OF THE STUDY

Every learner has an equal right to be educated and develop to his fullest potential. Optimum human resource development is not possible without catering the educational needs of all learners. While initially focused as a strategy for providing access to the curriculum for students with disabilities, UDL has simultaneous benefits to many other students (Rose D., 2005). Once the UDL is adopted in the whole education system, it can very well increase the access of the students and chances are more for a barrier-free learning environment.

Educating student teachers plays a major role in educational development. It will be possible to solve the problem of quality education if student teachers will be taught in the way, as they should be supposed to teach in their classes. By conducting the research in this field will shed light on the appropriate teaching interventions for student teachers. In the field of higher education, the best area to try out the effectiveness of any new teaching approach is probably the education. The present study will be fruitful to both the researchers and student teachers. Incorporation of UDL in teacher education program will give an idea to prospective teachers about UDL by which they will learn the application aspect of UDL and may use it in their class as a strategy to teach their students.

The provision of digitized reading materials, access to computers with assistive devices, choice of examination methods, promoting open access and open educational resources will go a long way in furthering higher education amongst students who have disabilities (Ahmad, 2016). Modifications to the learning environment—Text to speech, Images with Text, closed caption with videos and images, modifiable formatting, hyperlinks for meanings, choices for content and topic selection, multiple ways of assessment and engagement are beneficial to many people, not

just those with disabilities. As, people today routinely use door openers to enter a building when their hands are full, just as skateboarders use curb cuts and children visiting the hospital can drink water from a fountain without assistance. Similarly, commuters in noisy airports and students in quiet libraries rely equally on TV closed captioning.

This research will be helpful to administrators, educationist, teachers, and parents, to understand the needs of different learners in virtual as well as real classrooms. This research will also provide an idea to implement flexible teaching methods which can be customized and adjusted according to the needs of learners.

Till now, researchers have focused mainly on interventions related to teaching in a normal classroom, or in the classroom having special students. If we are able to enhance universal methods in teaching which cater the need of all students, we can say that to some extent it will have a positive impact on achievement also. Thus we hope that this research work will provide a productive way forward to help online as well as face to face learners and as a means of removing obstacles from their path of progress and also to improve academic achievement.

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